REMARKS

The following remarks are made in response to the Non-Final Office Action mailed June 8, 2009. Claims 13-32 were rejected. Claim 19 has been objected to. With this Response, claims 19 and 29 have been amended. Claims 13-32 remain pending in the application and are presented for reconsideration and allowance.

Claim Objections

The Examiner objected to claim 19. With this response, Applicant has amended the claims accordingly, and it is now in condition for allowance.

Claim Rejections under 35 U.S.C. § 102

The Examiner rejected claim 29 under 35 U.S.C. § 102(b) as being anticipated by the Madou et al. U.S. Patent No. 4,874,500. Applicant respectfully disagrees that the claim as amended is taught or suggested.

As amended, claim 29 is a biosensor circuit with an integrated circuit in a substrate and an integrated reference electrode in the integrated circuit formed on the substrate. It includes a core of the integrated reference electrode that is made ***by printing silver as metal on the substrate*** and is at least partially surrounded by a sheath made of a sparingly soluble salt of the silver metal. There are sensor arrays including biological molecules. The integrated circuit is electrically coupled to the core of the integrated reference electrode.

On page 2 of the Office Action, the Examiner indicates that *Madou* describes a biosensor circuit comprising the feature of "forming a core of an integrated reference electrode by ***depositing silver material*** as metal on the substrate." In contrast thereto, claim 29 provides a core of the integrated reference electrode that ***is made by printing silver as metal on the substrate***. Hence, in contrast to *Mudou*, according to claim 29 the core is made by a printing technique for printing the silver material on the substrate. In other words, claim 29 identifies a specific deposition of silver, namely printing.

Hence, claim 29 is not anticipated by *Madou*. Because dependent claims 30-32 depend therefrom, they too are not anticipated by *Madou*. Therefore, Applicants respectfully request

reconsideration and withdrawal of the 35 U.S.C. § 102(b) rejection to claim 29, and request allowance of these claims.

Claim Rejections under 35 U.S.C. § 103

The Examiner rejected claims 13 and 16-19 under 35 U.S.C. § 103(a) as being unpatentable over the Madou et al. U.S. Patent No. 4,874,500 in view of the Hill et al. U.S. Patent No. 5,727,548.

The Examiner rejected claims 14, 15 and 20 under 35 U.S.C. § 103(a) as being unpatentable over the Madou et al. U.S. Patent No. 4,874,500 in view of the Hill et al. U.S. Patent No. 5,727,548 as applied to claim 13 and further in view of Saito et al. U.S. Patent No. 6,021,339.

The Examiner rejected claims 21 and 24-27 under 35 U.S.C. § 103(a) as being unpatentable over the Madou et al. U.S. Patent No. 4,874,500 in view of the Yoshikawa English Translation of JP 11238733 and Hill et al. Patent No. 5,727,548.

The Examiner rejected claims 22, 23 and 28 under 35 U.S.C. § 103(a) as being unpatentable over the Madou et al. U.S. Patent No. 4,874,500 in view of the Yoshikawa English Translation of JP 11238733 and Hill et al. Patent No. 5,727,548 as applied to claim 13 and further in view of Saito et al. U.S. Patent No. 6,021,339.

The Examiner rejected claims 30-32 under 35 U.S.C. § 103(a) as being unpatentable over the Madou et al. U.S. Patent No. 4,874,500 in view of Hill et al. Patent No. 5,727,548. Applicant respectfully disagrees.

Claim 13 is a method for producing a biosensor circuit. It includes forming an integrated circuit in a substrate and forming a core of an integrated reference electrode by means of printing silver material as metal on the substrate. Biological molecules are applied by means of printing on sensor arrays of the biosensor circuit arrangement, whereby the sensor arrays are biologically activated. The printing of silver material is effected on the substrate and the printing of the biological molecules on the sensor arrays are effected in the same work step. Subsequently, at least partially surrounding the core made of silver material by a sheath made of a sparingly

soluble salt of the silver material, thereby forming the integrated reference electrode. The integrated circuit is electrically coupled to the core of the integrated reference electrode.

On page 4 of the Office Action, The Examiner asserts that *Madou* describes the feature of "forming a core (silver layer) of an integrated reference electrode (reference electrode) by ***depositing silver material*** as metal on the substrate (12) . . . ." (emphasis added). In contrast thereto, claim 13 cites "forming a core of an integrated reference electrode by means of ***printing silver material*** as metal on the substrate".

As taught at col. 17, lines 63 through col. 18, lines 3 in *Madou,* sputtering techniques are used for forming the electrodes. Hence, *Madou* teaches away from claim 13, which claims the very opposed technique of printing the silver material on the substrate.

Further, in the above-mentioned Office Action, it is admitted that *Madou* does not teach the applying biological molecules by printing on the sensor array and effecting the printing of silver material on the substrate and printing of the biological molecules on the sensor array in the same work step. In this context, *Hill* is cited, which describes a production method for strip electrodes.

As is disclosed in col. 12, lines 40 to 48, the production method taught in *Hill* is performed in three steps:

I - screen printing of Ag/AgC1 reference electrode and metal tracing,

II- screen printing of the active electrode with a printing ink comprising a colloidal carbon, glucose oxidase in the buffer, and an organic polymer, and

III- screen printing, spraying or dip coating to provide a membrane over the assembly.

As such, the production of the electrodes according to *Hill* is made ***in three steps***. In contrast thereto, according to claim 13, the printing of silver material on the substrate and the printing of the biological molecules on the sensor arrays are effected ***in the same work step***.

Hence, *Hill* clearly teaches away from subject matter of claim 13, since *Hill* unambiguously recommends carrying out the production of the strip electrode arrangement in three steps.

Performing the printing of silver material on the substrate and the printing of the biological molecules on the sensor arrays in the same work step solves the problem occurring in prior art of significantly reducing the complexity and costs of producing biosensors, since the same printing method is used in a method step in order to apply the reference electrode as that used for the biological molecules.

For these reasons it is not obvious to combine *Madou* and *Hill*, and even if combined, they fail to teach all the features of the claims. Therefore, claim 13 is non-obvious over a combination of *Madou* and *Hil*, as are the dependent claims 14-20.

Finally, claim 21 is a method for producing a biosensor circuit including forming an integrated circuit in a substrate and forming a core of an integrated reference electrode made of silver as metal by printing silver salt material on the substrate and chemically reducing the silver salt material to form silver. It includes applying biological molecules by means of printing on sensor arrays of the biosensor circuit arrangement, whereby the sensor arrays are biologically activated, and effecting the printing of the core of the integrated reference electrode on the substrate and the printing of the biological molecules on the sensor arrays in the same work step. Subsequently, at least partially surrounding the core of the integrated reference electrode by a sheath made of a sparingly soluble salt of the silver as metal, thereby forming the integrated reference electrode. Finally, it includes electrically coupling the integrated circuit to the core of the integrated reference electrode.

On page 8 of the above-mentioned Office Action the Examiner asserts that *Madou* describes the feature of "forming a core (silver layer) of an integrated reference electrode (reference electrode) by ***depositing silver material*** as metal on the substrate (12) . . . ." (emphasis added).

In contrast thereto, claim 21 claims "forming a core of an integrated reference electrode made of silver as metal by ***printing silver salt material*** as metal on the substrate and chemically reducing the silver salt material to form silver". In other words, claim 21 claims a specific deposition of silver, namely printing.

As taught at col. 17, lines 63 through col. 18, lines 3 in *Madou,* sputtering techniques are used for forming the electrodes. Hence, *Madou* teaches away from claim 13, which claims the very opposed technique of printing the silver material on the substrate.

In this context, in the Office Action, *Yoshikawa* is cited for curing the above-mentioned deficiencies of *Madou*. Because *Madou* teaches away from the printing method according to claim 21, however, it would be very unlikely that a person skilled in the art, coming from *Madou*, would look to art for printing techniques.

Furthermore, even if the person skilled in the art studied such documents relating to printing techniques, it would be although very unlikely that the person skilled in the art trying to optimize production method of biosensor circuits and the electrode arrangement thereof, would study the manufacture of interconnections in electronic devices like metal insulator transistors, as mentioned in paragraph [0002] of *Yoshikawa.*

Furthermore, even if the person skilled in the art took into account *Yoshikawa,* although it is very unlikely, he would merely find a method of depositing a silver nitrate solution on grooves and reducing the solution to silver and after that mechanochemical polishing for removing the part of the silver layer, which is outside the grooves. Hence, *Yoshikawa* discloses ***the forming of the interconnections by filling the silver nitrate solution into grooves and by using the method of mechanochemical polishing***, which is rather similar to a damascene process but not to a printing method.

Consequently, *Yoshikawa* also teaches away from claim 21, which claims the feature of forming a core of an integrated reference electrode made of silver as metal by ***printing silver salt material on the substrate*** and chemically reducing the silver salt material to form silver.

Hill does not disclose the method of ***printing silver salt material on the substrate*** and chemically reducing the silver salt material to form silver.

Therefore, claim 21 is non-obvious over a combination of *Madou, Yoshiknwa* and *Hill.*

Due to analogue reasons, also the dependent claims 14-20 and 22-28 are new and inventive in the light of prior art cited in the above-mentioned Office Action. Therefore,

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejection to claims 30-32, and request allowance of these claims.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 13-32 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 13-32 are respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to Paul P. Kempf at Telephone No. (612) 767-2502, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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